Navigating the New Jersey & Washington State Stormwater Programs as Models for Approving Manufactured Treatment Devices

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47th Environmental Show of the South
May 16-18, 2018
Chattanooga, Tennessee

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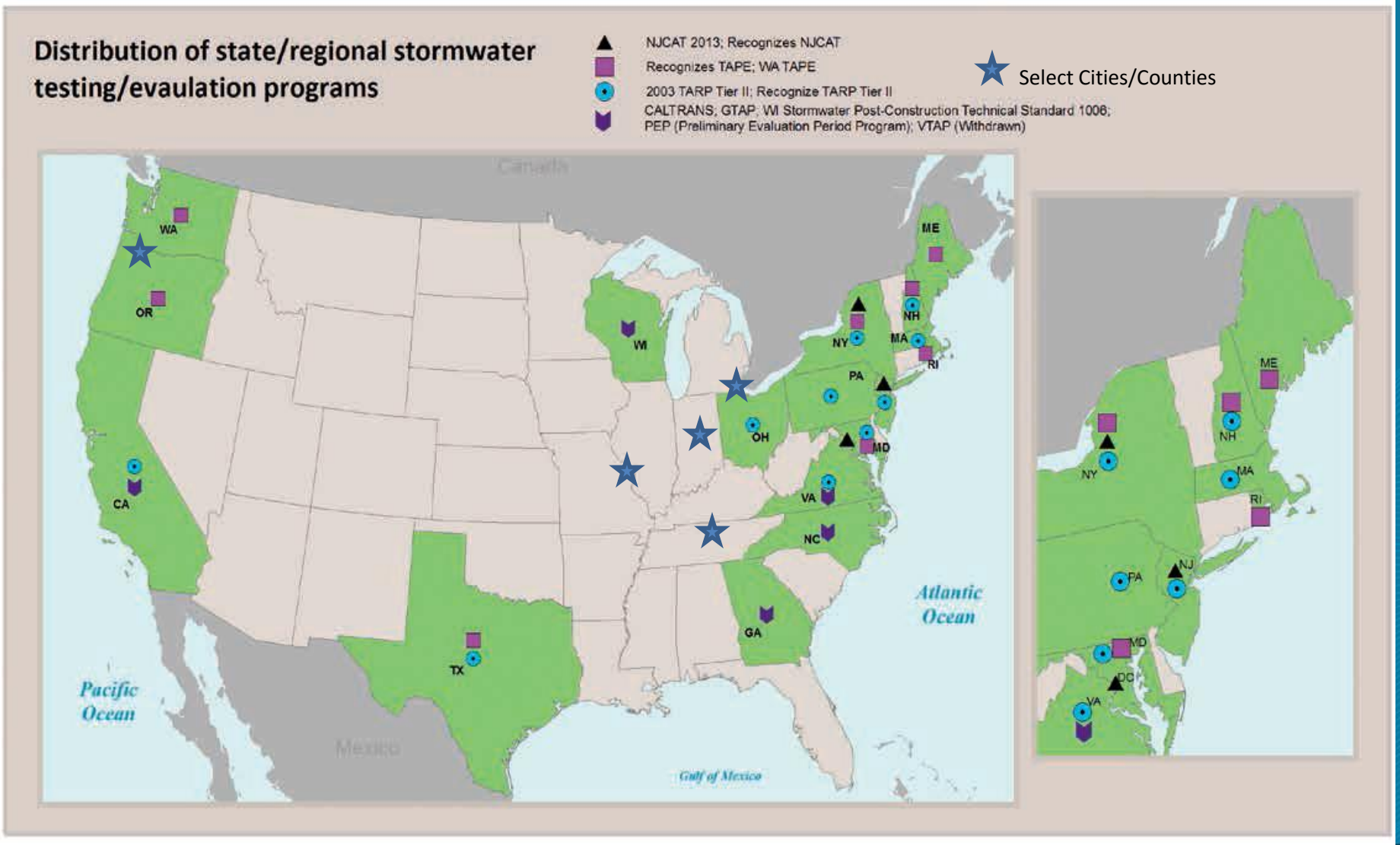
WATER TREATMENT SOLUTIONS

A bunch of stormwater programs…no consistency



Modified from www.werf.org, Executive Summary, Document #INFR2R14

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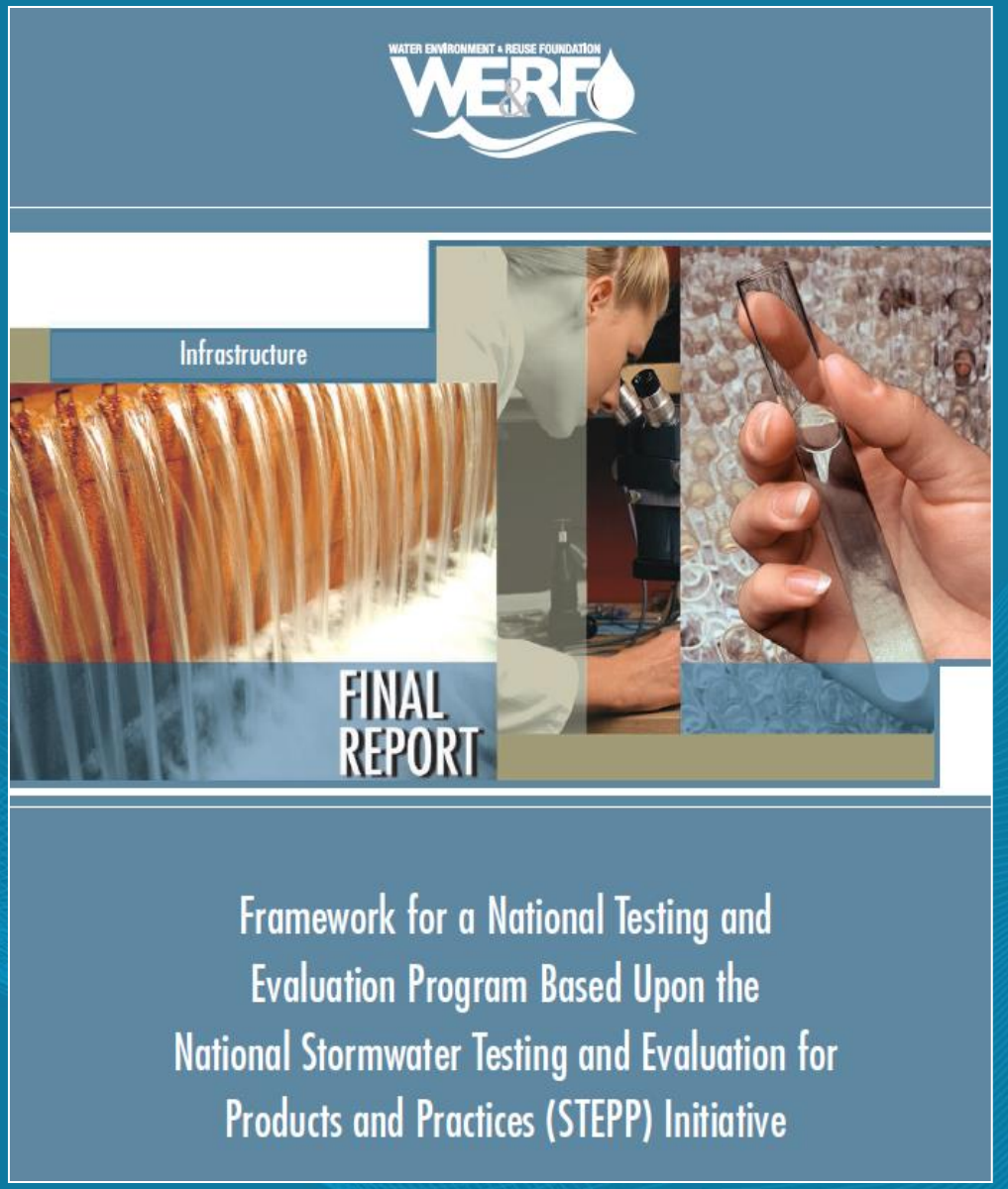
Then in mid-2016…

- ***Proposes a National program to evaluate products and practices.***
- ***Draws upon New Jersey & Washington State stormwater programs for MTD evaluations.***



From WERF 2016

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STEPP draws on 2 programs as models for approving (evaluating) Manufactured Treatment Devices (MTDs)…

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NJ STORMWATER.ORG
Stormwater in New Jersey

Lab testing protocol

DEPARTMENT OF
ECOLOGY
State of Washington

Field testing protocol

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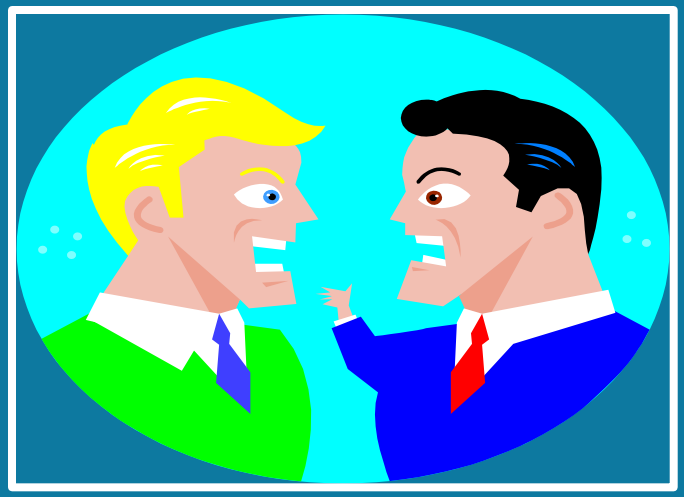
A Spirited Debate: Lab vs. Field Testing



- ***Lab testing*** provides repeatable and defensible results under controlled conditions to allow for side by side comparsions of MTD performance testing.
- ***Field testing*** is a logical progression from lab testing and provides long term, real world results under random storm conditions under which an MTD would be expected to encounter.

Two Step Process for NJDEP "Certification"

Step 1: NJCAT "Verification"

NJCAT Corporation for Advanced Technology

www.njcat.org

Step 2:
NJDEP "Certification"
(if eligible)

State of New Jersey
Department of Environmental Protection
NJ Stormwater.org
Stormwater in New Jersey

www.njstormwater.org/treatment.html

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STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NJ STORMWATER.ORG
Stormwater in New Jersey

NJCAT Verification vs. NJDEP Certification

- ***NJCAT Verification provides independent documentation of a protocol-based performance claim for an MTD in either a lab and/or field test setting.***

- ***NJDEP Certification allows an eligible MTD to be specified within New Jersey under conditions specific to state stormwater rules.***

We'll talk about eligibility later…..

Process for Approval of MTDs

New Jersey Department of Environmental Protection
Process for Approval of Use for Manufactured Treatment Devices
January 25, 2013

This document outlines the process for a stormwater manufactured treatment device (MTD) to be approved by the New Jersey Department of Environmental Protection (NJDEP) in compliance with the Stormwater Management rules, N.J.A.C. 7:8. Prior to a MTDs entrance into the NJDEP process, the MTD must obtain Verification through the New Jersey Corporation for Advanced Technology (NJCAT). The process for NJCAT Verification is available at www.njcat.org entitled "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology: For use in accordance with the Stormwater Management Rules, N.J.A.C. 7:8". In addition to these process documents there are protocols for sedimentation and filtration MTDs that must be used for approval, the protocols are available at www.njstormwater.org.

NJDEP Process

Upon successful completion of the technical and regulatory standards and the completion of the reporting of those standards in the NJCAT Verification Report, NJCAT will provide NJDEP's Stormwater Management Unit a link to their website where the Verification Report can be found. In addition to the Verification Report link, NJCAT will supply the MTD name, the MTD manufacturer name and the respective TSS percent removal rate.

The NJCAT Verification will include the following components: Description of Technology, Laboratory Test Setup, Performance Claims, Supporting Documentation, Design Limitations, Maintenance Plans, Statements of Compliance and a Verification Appendix. The Verification Appendix will highlight and translate the design specifications found in the rest of the Verification Report to the design engineer.

Formal representation of a NJDEP approval will be established on the NJDEP stormwater website at www.njstormwater.org. The website will contain the MTD name, the MTD manufacturer name and the respective TSS percent removal rate. Upon approval, the MTD can be used for compliance with the Stormwater Management rule as long as the conditions of the NJCAT Verification are met.

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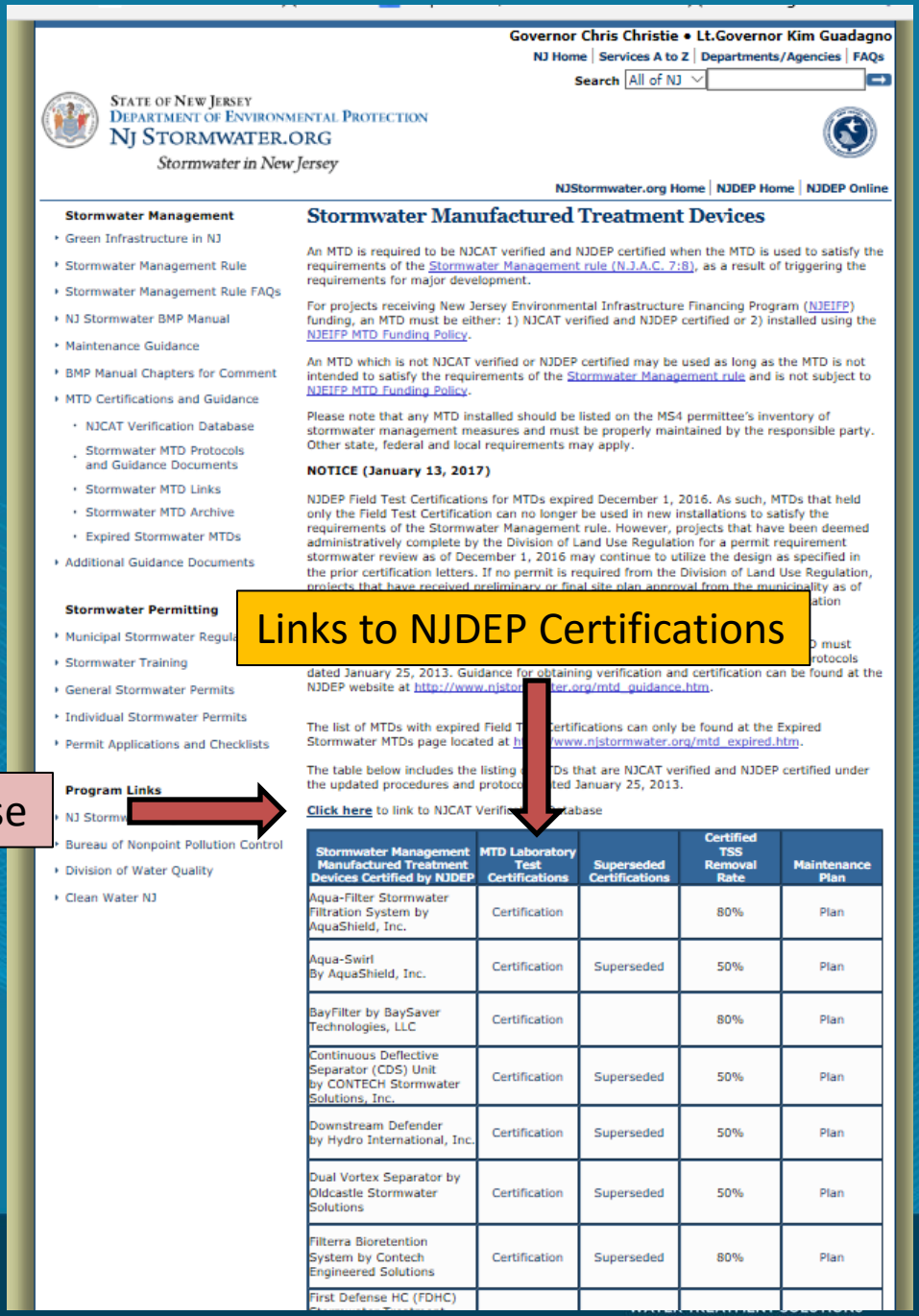
NJDEP Lists MTD Certifications @
www.njstormwater.org/treatment.html

Link to NJCAT Verification Database



www.njcat.org

NJCAT Corporation for Advanced Technology

Promoting Emerging Energy and Environmental Technologies

- About Us
- Verification Process

Technology Verification

The Energy and Environmental Technology Verification (EETV) Act at N.J.S.A. 13:1D-134 et seq., establishes the guidelines for a verification and certification process to approve the use of innovative energy and environmental technologies that benefit the environment and economy of New Jersey. The New Jersey Legislature found that, in establishing the technology verification and certification program, it is in the public's interest to encourage the commercial development and use of new technology-based environmental and energy related products, services and systems that abate and prevent environmental pollution and promote energy conservation in the most cost-effective and environmentally efficient manner in the State.

Highlights

Although innovative environmental and energy technologies often consume fewer natural resources than traditional methods, they encounter numerous technical, financial and regulatory impediments. Over the years, NJCAT has broken down many of the barriers, but there are still daunting challenges facing innovative technologies.

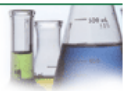
Stormwater Treatment Systems

Stormwater Management Technologies in particular are difficult to evaluate. Pollutant removal performance depends upon many factors, e.g., influent particulate size distribution, influent pollutant concentration (loading), stormwater flow rate, sump design and capacity, and maintenance. NJCAT involvement and activities over the past decade in identifying and evaluating a number of pre-manufactured stormwater treatment devices has created the knowledge and experience base necessary to effectively and confidently assess anticipated sediment removal performance.

The New Jersey Stormwater rules (35 N.J.R. 154) clearly establish that manufactured stormwater

News

About NJCAT



NJCAT was created to promote in New Jersey the retention and growth of technology-based businesses in emerging fields such as environmental and energy. NJCAT provides innovators with the regulatory, commercial, and technological assistance required to bring their ideas to market successfully. Specifically, NJCAT functions to:

*** advance policy strategies and regulatory mechanisms to promote technology commercialization,**

*** identify, evaluate, and recommend specific technologies for which the regulatory and commercialization process should be facilitated,**

*** establish relationships/alliances to bring new technologies to market and new business to the state, and**

*** assist in the identification of markets and applications for commercialized technologies.**

Operating as a public private partnership is the cornerstone of the NJCAT programs; in this manner, the commercial marketplace has direct input to the technology development and commercialization process and the public sector gains confidence in technology solutions through reliance on an independent honest broker examination of technology performance.

Richard S. Magee Sc.D., P.E., BCEE
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New Jersey Corporation for Advanced Technology
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Stevens Institute of Technology
Castle Point on Hudson
Hoboken, NJ 07030
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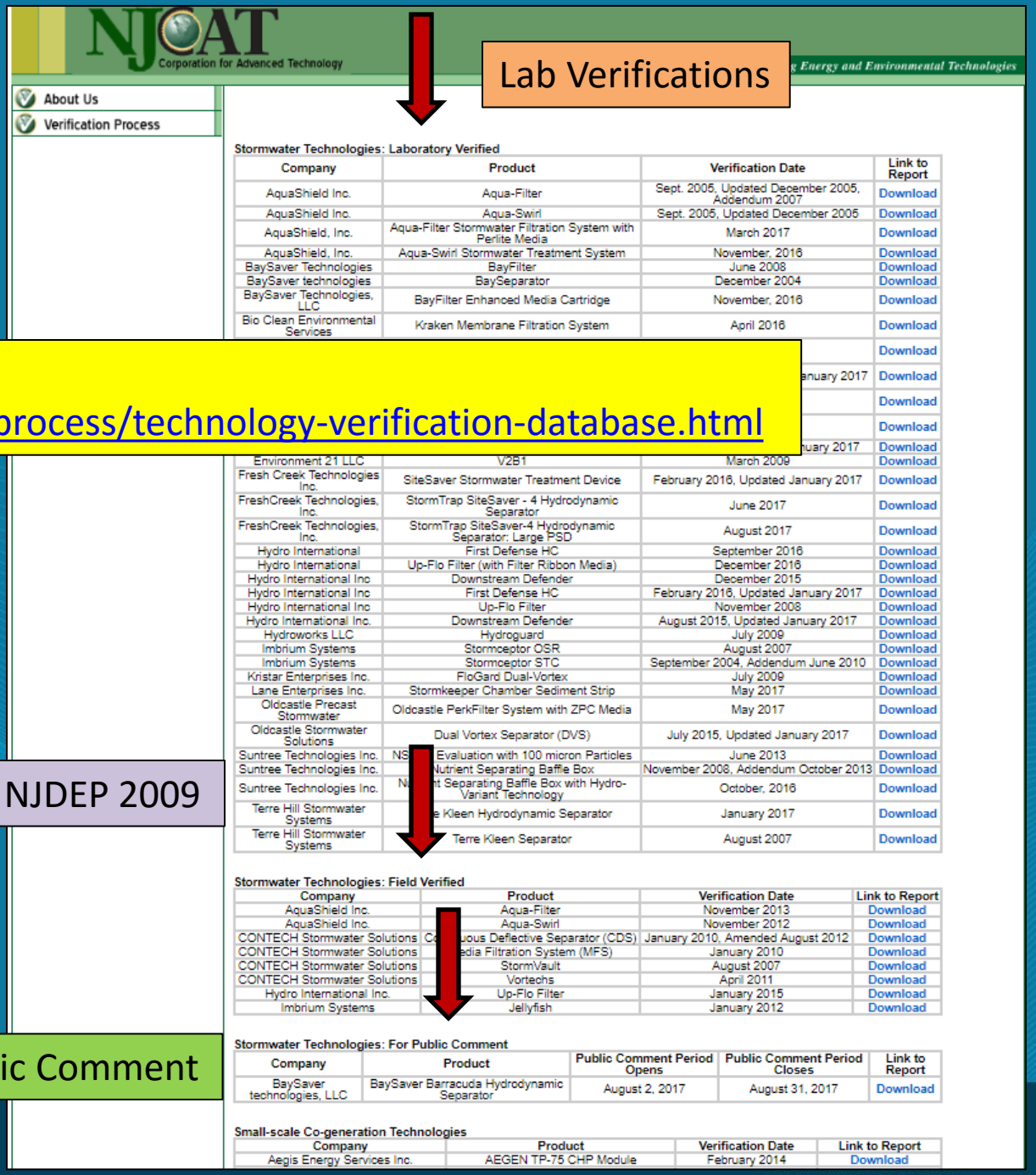


NJCAT MTD Verifications @ www.njcat.org/verification-process/technology-verification-database.html

Field Verifications per TARP or NJDEP 2009

Lab Verifications open for Public Comment

Ever heard of TARP? Well, it is no longer applicable to NJDEP

The Technology Acceptance Reciprocity Partnership

Protocol for

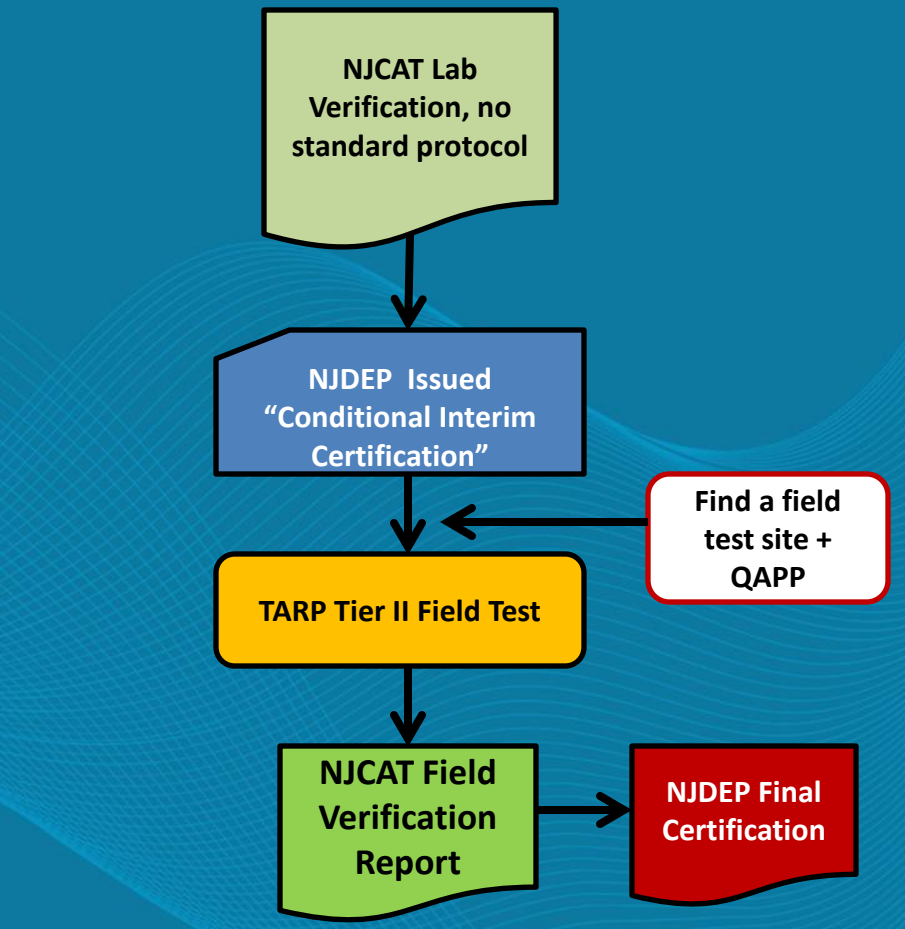
Stormwater Best Management Practice Demonstrations

Endorsed by
California, Massachusetts, Maryland,
New Jersey, Pennsylvania, and Virginia

Final Protocol 8/01
Updated: 7/03

TARP
Technology Acceptance and Reciprocity Partnership

Original NJDEP Certification Process



There was no TARP Tier I

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STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NJ STORMWATER.ORG
Stormwater in New Jersey

New Jersey Lab Testing Protocols for HDSs and Filters

New Jersey Department of Environmental Protection
Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device

January 25, 2013

New Jersey Department of Environmental Protection
Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device

January 25, 2013

http://www.njstormwater.org/treatment.html

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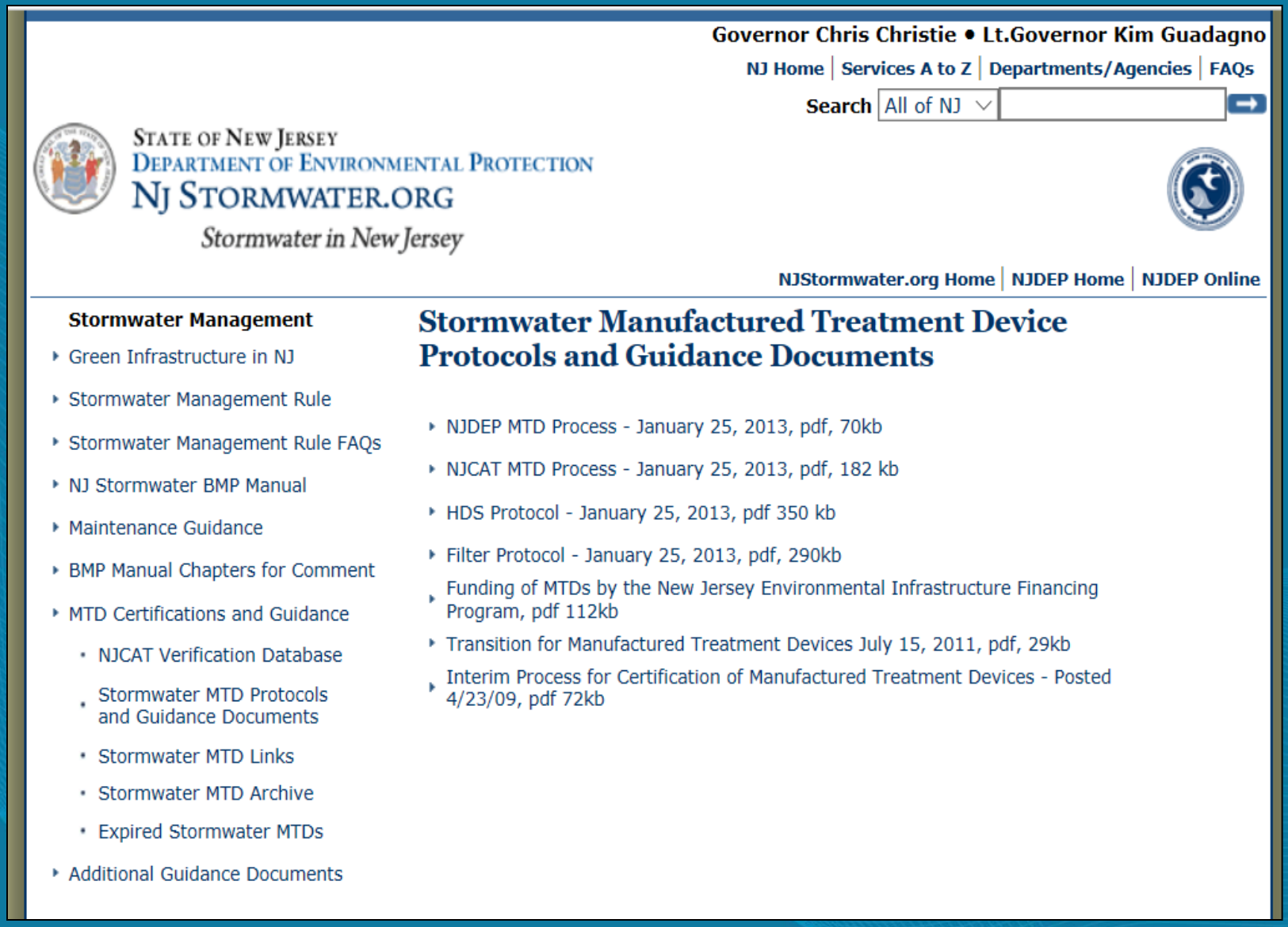

http://www.njstormwater.org/mtd_guidance.htm

NJCAT Corporation for Advanced Technology

Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology

For use in accordance with the Stormwater Management Rules, N.J.A.C. 7:8

January 25, 2013

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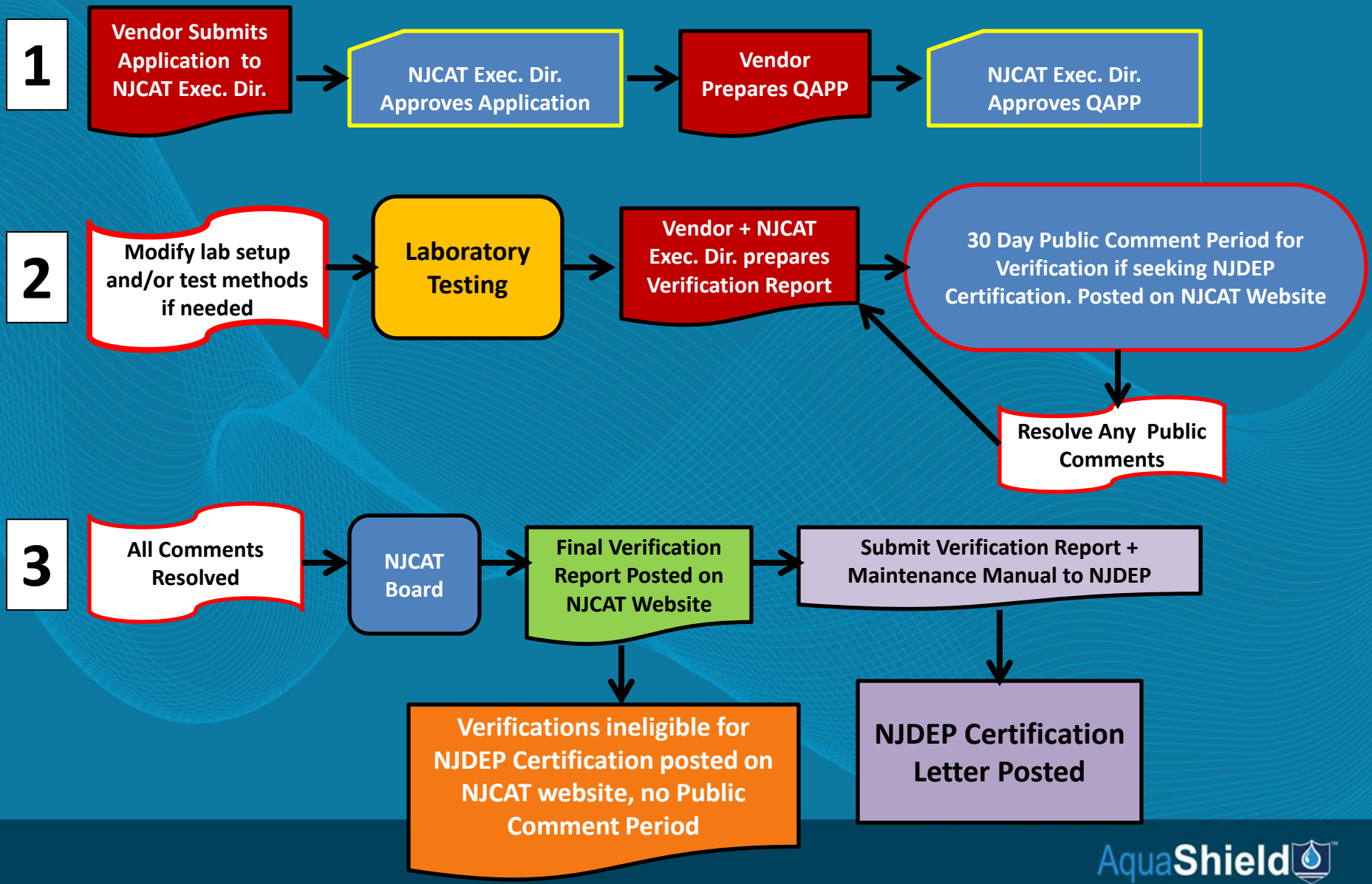
NJCAT Verification + NJDEP Certification Process



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Example NJDEP Certification Letter (1st page)

NJDEP Limits:

HDSs to 50% annual TSS

Filters to 80% annual TSS

Regardless of whether the NJCAT Verification is for a greater annual TSS removal efficiency percentage.

KIM GUADAGNO

CHRIS CHRISTIE
Governor

Lt. Governor

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

BOB MARTIN
Commissioner

March 15, 2017

Mark B. Miller, Research Scientist
AquaShield™, Inc.
2733 Kanasita Drive, Suite 111
Chattanooga, Tennessee 37343

Re: Revised MTD Lab Certification
Aqua-Swirl® Stormwater Treatment System by AquaShield™, Inc.

TSS Removal Rate 50%

Dear Mr. Miller:

This revised certification letter supersedes the Department's prior certification dated December 1, 2016. This revision only removes the Required Sediment Removal Interval column from Table A-1 in order to avoid confusion regarding maintenance requirements. All other conditions of the certification remain unchanged.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). AquaShield™, Inc. has requested an MTD Laboratory Certification for the Aqua-Swirl® Stormwater Treatment System, which is a vortex hydrodynamic separator.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated November 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

? If following NJDEP as a model for local approval…

Require only NJCAT Verification?

NJCAT Corporation for Advanced Technology

Then which Verification?

- 2013 Lab + MTDs Ineligible for Certification
- CIC Lab (Certifications expired)
- NJDEP 2009 Field (Certifications expired)
- TARP Tier II Field (Certifications expired)

OR…

State of New Jersey
Department of Environmental Protection
NJ STORMWATER.ORG
Stormwater in New Jersey

Require NJDEP Certification per 2013 Protocol?

"***Level Playing Field***", all hold Final Certification

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Consider 4 fundamental aspects of the NJDEP/NJCAT MTD Process

1. NJDEP Certification is specific to New Jersey stormwater rules. An MTD must hold NJDEP Certification in order to be specified in New Jersey.

2. NJDEP Certification does not necessarily carry a higher level of technical scrutiny beyond that of an NJCAT Verification. However, NJDEP reviews maintenance manuals, NJCAT does not. NJDEP Certifications includes Maintenance Manual as part of Cert. Letter.

3. Not all NJCAT Verifications for an MTD are eligible for NJDEP Certification when there is a deviation from the protocol. This has significant ramifications for MTD sizing outside of NJ.

4. An NJCAT Verification can be issued for an MTD *technology* that is not recognized by NJDEP to be eligible for Certification. This has significant ramifications for MTD technology approval outside of NJ.

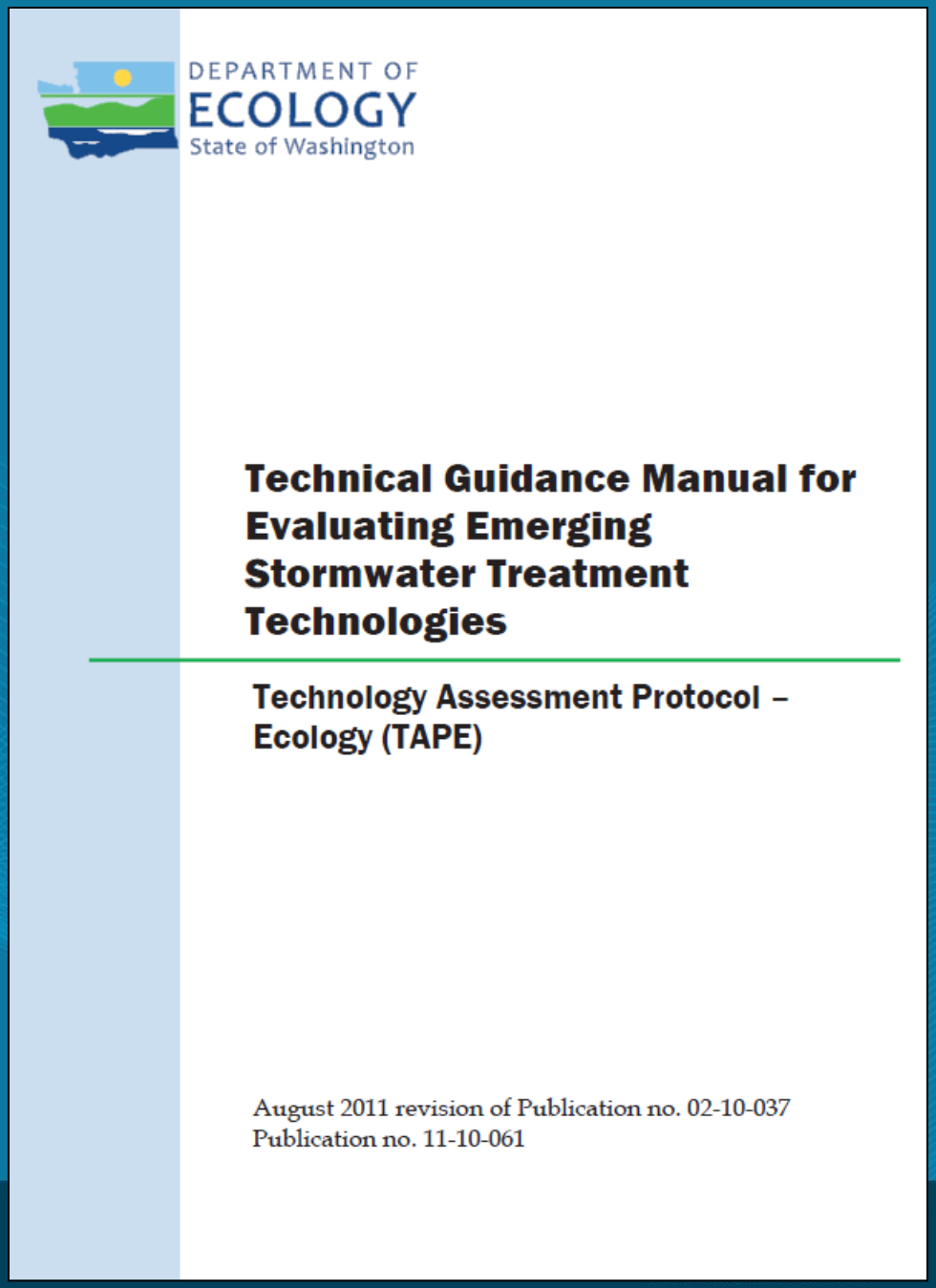
Let's look closer at NJCAT/NJDEP Aspects #3 & #4

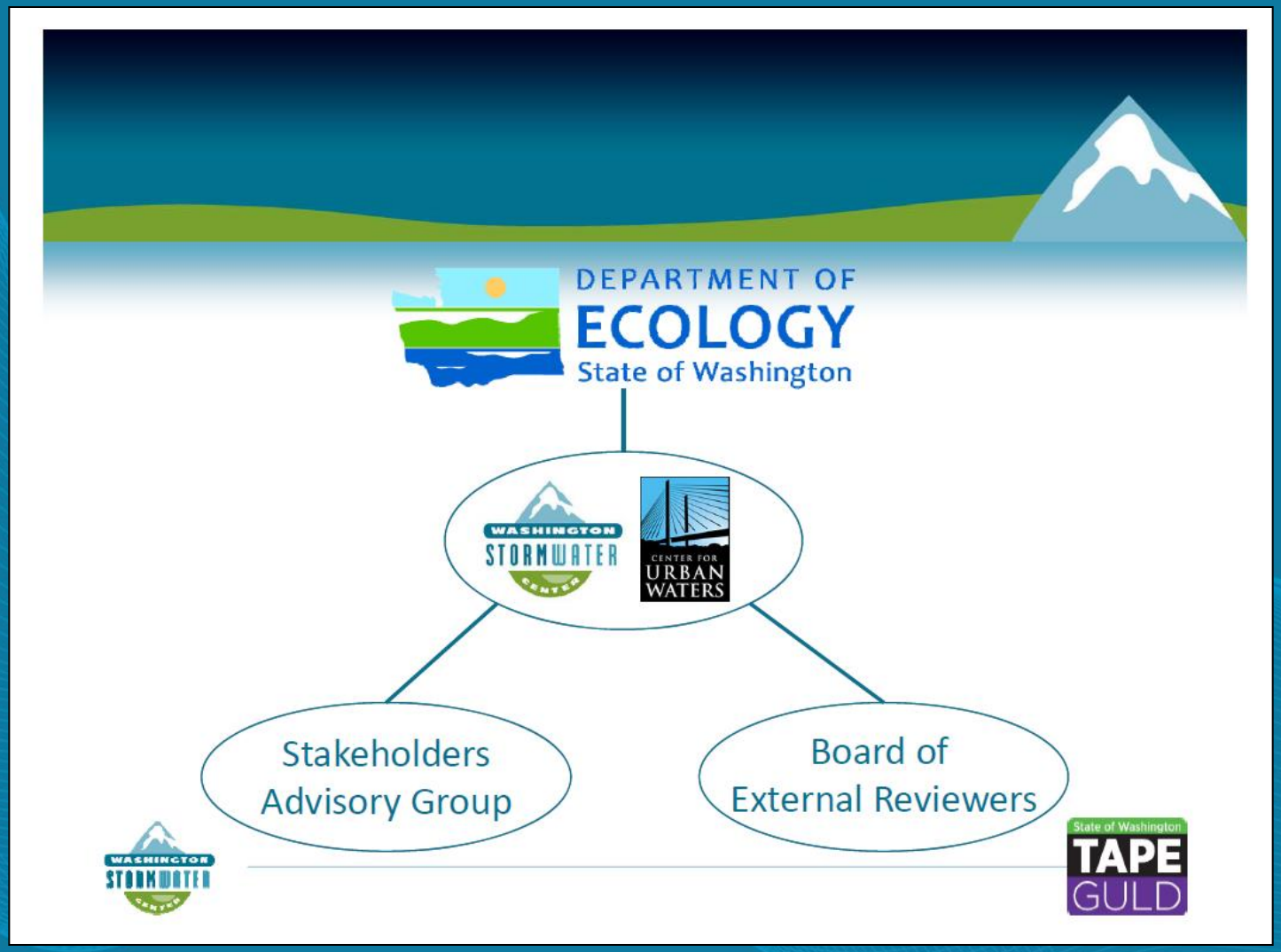
#3: Deviation from Protocol - Sizing: **An MTD test follows the protocol but uses a coarser PSD. An NJCAT Verification could still be obtained but that test would *not be eligible* for NJDEP Certification since the test purposefully deviated from the protocol to obtain a more favorable performance result. If an agency outside of NJ accepts NJCAT verifications only, then this test would allow for MTD sizing to be more favorable (smaller MTD) compared to those MTDs that tested to the protocol using the finer specified PSD (larger MTD). *Could this lead to undersizing?***

#4: Ineligible Technology for Certification: **The NJCAT Application will identify whether an MTD technology is accepted by NJDEP, and whether the proposed MTD test will be eligible for NJDEP Certification. For example, NJDEP considers underground infiltration structures (inclusive of fabric) not to be filtration MTDs and not eligible for Certification. However, NJCAT can issue a Verification for that technology as a pretreatment device but not NJDEP eligible. Agencies outside of New Jersey can then make their determination whether (a) that technology is an MTD, or (b) to allow the Verification (and sizing) for pretreatment and/or filtration.**

- "TAPE" is Ecology's process for approving emerging & proprietary technologies (MTDs)
- Current TAPE is August 2011, Revised Version in progress

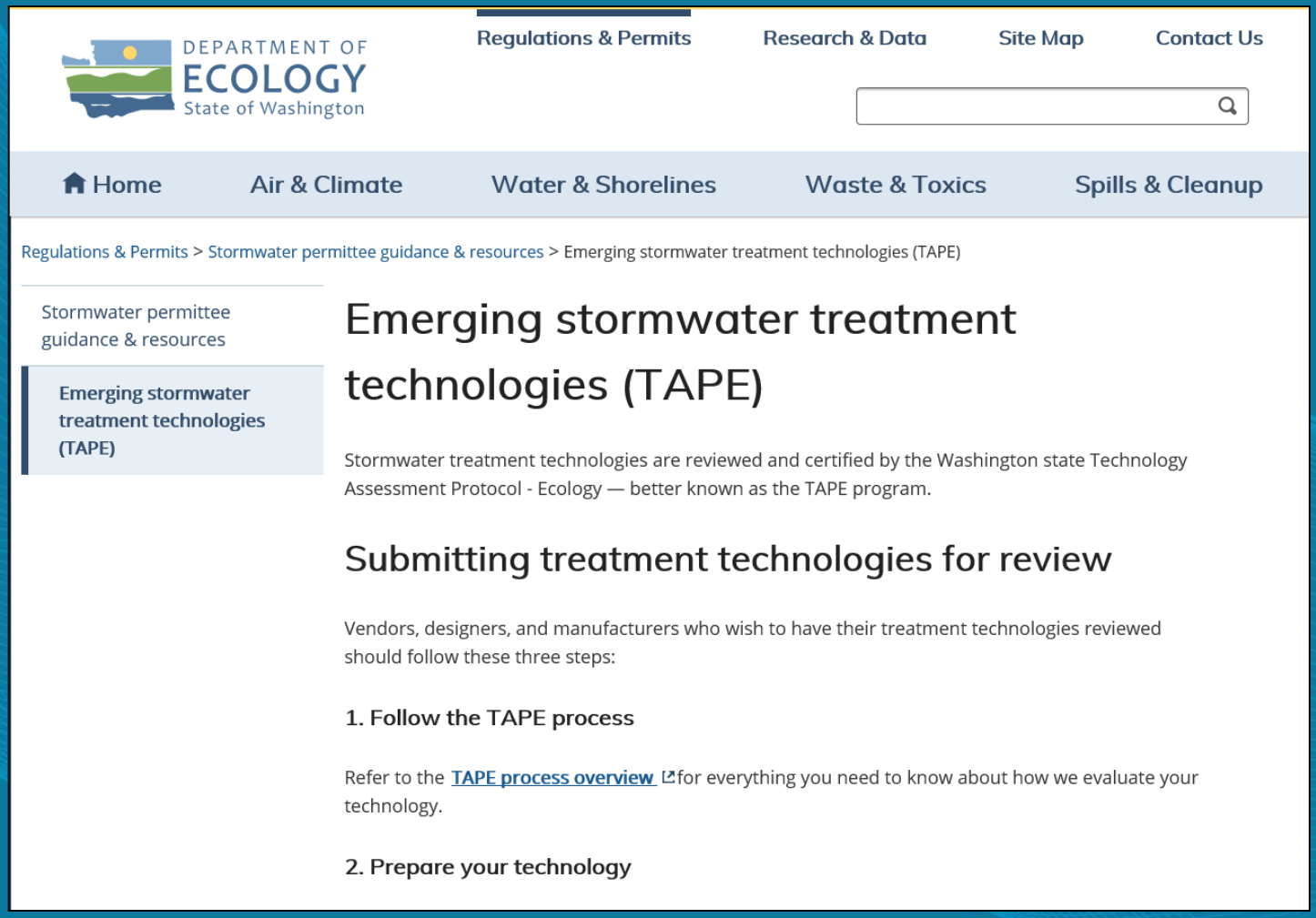
How hard could it be to get some field samples? Well, 73 pages worth.





Select WDOE/TAPE slides taken from presentation at Washington State Municipal Stormwater Conference, May 17, 2017, Carla Milesi, WSC

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies



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DEPARTMENT OF ECOLOGY
State of Washington

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2. Prepare your technology

Refer to the 2011 TAPE guidance manual as you prepare your technology for review and certification.

3. Send in your application

The application form and fee must be submitted **both** as a hard copy and digitally to:

TAPE Program
Washington State Department of Ecology
Cashiering
PO Box 47611
Olympia, WA 98504-7696

Email: douglas.howie@ecy.wa.gov

We also review chemical technologies

We also accept applications to the Chemical Technology Assessment Protocol – Ecology (C-TAPE) program. See the construction site chemical technology guidance for more information.

DEPARTMENT OF ECOLOGY
State of Washington

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Approved technologies

The following table lists the devices that have received a designation through the TAPE process.

In addition to our certification, local jurisdiction approval is required (and not guaranteed) for installation of treatment technologies we have evaluated and given a use designation.

All | Pretreatment | Oil | Enhanced | Basic | Phosphorus | Construction

Manufacturer	Device Name	Treatment Type	Use Designation
AquaShield, Inc.	Aqua-Filter System, Aqua-Blend C Filter Media	Basic Treatment	Pilot Level
AquaShield, Inc.	Aqua-Filter System, Coarse Perlite Filter Media	Basic Treatment	Cond Level
BaySaver Technologies, Inc.	BayFilter w/ BFC Media	Basic Treatment	Gene Level
BaySaver Technologies, Inc.	BayFilter w/EMC Media	Basic Treatment	Gene Level
BaySaver Technologies, Inc.	BayFilter w/GAC Media	Basic Treatment	Pilot Level

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Example GULD for Pretreatment (50% TSS per storm)

(Page 1 of 5)

WASHINGTON STATE DEPARTMENT OF ECOLOGY

April 2017

GENERAL USE LEVEL DESIGNATION FOR PRETREATMENT

For
AquaShield™, Inc.'s Aqua-Swirl® Stormwater Treatment System

Ecology's Decision:

Based on AquaShield™, Inc. application submissions, Ecology hereby issues the following use level designations:

1. **General Use Level Designation (GULD) for the Aqua-Swirl® for pretreatment use (a) ahead of infiltration treatment, or (b) to protect and extend the maintenance cycle of a Basic or Enhanced Treatment device (e.g., sand or media filter)**

2. **The following table shows flowrates associated with various Aqua-Swirl models**

Model	Diameter (ft)	WQF (cfs)
AS-2	2.5	0.25
AS-3	3.5	0.64
AS-4	4.5	1.31
AS-5	5	1.78
AS-6	6	2.98
AS-7	7	4.63
AS-8	8	6.78
AS-9	9	9.48
AS-10	10	12.80
AS-11	11	16.79
AS-12	12	21.52
AS-13	13	27.03

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TAPE Use Level Designations

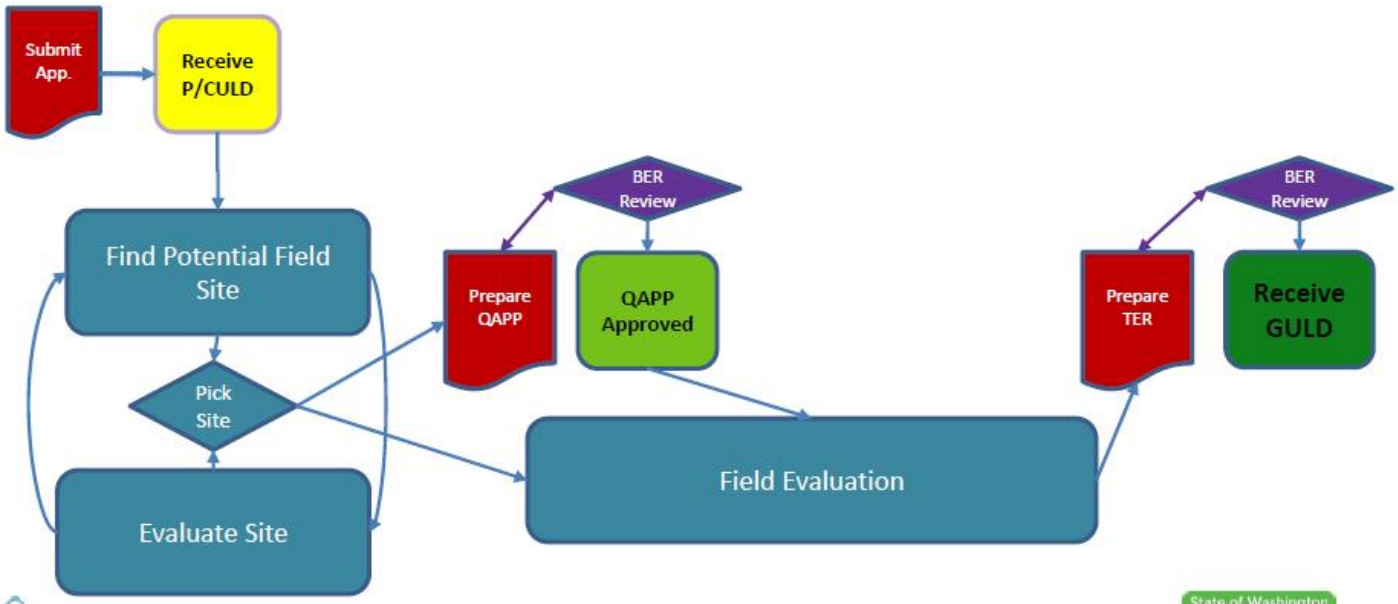
Use Level Designation	Minimum Data	Months (justified extensions allowed)	Max. # of Installations in WA	Field Testing Required
Pilot (PULD)	Lab data	30	5, Unlimited for Retrofits	All installation sites to be monitored. At least 1 indicative of or in Pacific NW
Conditional (CULD)	Field data, lab data may supplement	30	10, Unlimited for Retrofits	1 site indicative of or in Pacific NW
General (GULD)	Field data, lab data may supplement	Unlimited	Unlimited	None

Requirements for New/Redevelopment

- Treatment Facilities
  - Pretreatment (Total Suspended Solids)
  - Basic (Total Suspended Solids)
  - Enhanced (Dissolved Copper and Zinc)
  - Phosphorus (Total Phosphorus)
  - Oil (motor oil fraction of Total Petroleum Hydrocarbons)

TAPE Approval Timeline

~ 3 years, $250K



WASHINGTON STORMWATER CENTER

State of Washington TAPE GULD

AquaShield WATER TREATMENT SOLUTIONS

TAPE Performance Goals (*per event*)

Performance Goal	Influent Range	Criteria	Required Water Quality Parameters
Basic Treatment	20-100 mg/L TSS	Effluent goal ≤ 20 mg/L TSS [a]	TSS
	100-200 mg/L TSS	≥ 80% TSS removal [b]	
	> 200 mg/L TSS	> 80% TSS removal [b]	
Dissolved Metals Treatment	Dissolved copper 0.005 – 0.02 mg/L	Must meet basic treatment goal and better than basic treatment currently defined as > 30% dissolved copper removal [b,d]	TSS, hardness, total and dissolved Cu and Zn
	Dissolved zinc 0.02 – 0.3 mg/L	Must meet basic treatment goal and better than basic treatment currently defined as > 60% dissolved zinc removal [b,d]	
Phosphorus Treatment	Total phosphorus (TP) 0.1 to 0.5 mg/L	Must meet basic treatment goal and exhibit ≥ 50% TP removal [b]	TSS, TP, orthophosphate
Oil Treatment	Total petroleum hydrocarbons (TPH) > 10 mg/L [e]	1) No ongoing or recurring visible sheen in effluent 2) Daily average effluent TPH concentration < 10 mg/L [a,e] 3) Maximum effluent TPH concentration of 15 mg/L [a,e] for a discrete (grab) sample	NWTPH-Dx, visible sheen
Pretreatment	50-100 mg/L TSS	Effluent goal ≤ 50 mg/L TSS [a]	TSS
	≥ 100 mg/L TSS	> 50% TSS removal [b]	

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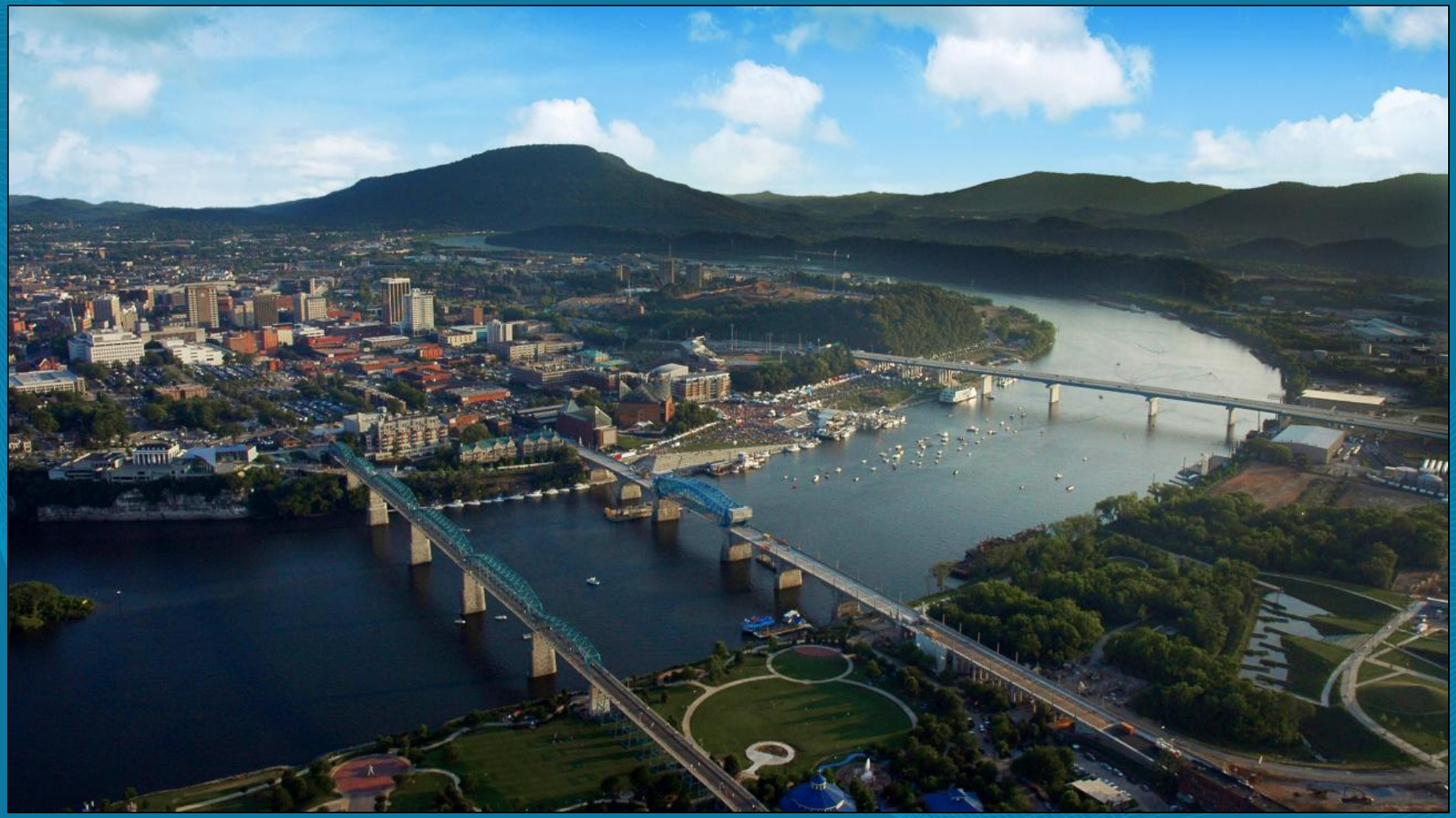
And in conclusion…

- Both the NJDEP/NJCAT & Ecology MTD approval processes provide robust performance testing programs to serve as models to assist other state/local regulators to evaluate MTD performance claims with greater confidence.
- MTD testing presents many challenges in the field and lab. Understanding the limitations of both is critical for any performance evaluation.
- The NJDEP/NJCAT lab-based approach allows for side-by-side comparison of MTD performance claims.
- Ecology's field-based approach provides long term, real-world performance and functionality to support MTD performance claims based on initial laboratory testing.
- NJDEP MTD certifications are specific to New Jersey to allow for MTD sales in New Jersey. Just because an MTD may hold NJCAT Verification, that verification may not be eligible for NJDEP Certification. Has significant marketplace implications outside of NJ.

It's all about good clean water…



Tennessee River, Chattanooga

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Thank you.

AquaShield™ WATER TREATMENT SOLUTIONS | INNOVATING GOOD CLEAN WATER

Mark Miller mmiller@aquashieldinc.com

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888-344-9044

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